THE LACK OF A CLEAR DEFINITION OF AGROFORESTRY HINDERS ITS ACCEPTANCE IN GERMANY

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Introduction

Agroforestry systems are receiving increasing attention in the temperate region due to their ability to counteract negative consequences of intensively managed agricultural fields. Examples of traditional agroforestry (AF) in central Europe are orchard meadows "Streuosbt", hedgerows "Knicks" and windbreaks. Traditional AF systems are considered to be areas of high natural and cultural value (HNCV), and as such have been recognized to support high biodiversity levels. Recently, modern AF systems which are well adapted to the current farming practices and are compatible with mechanized agriculture have emerged. Modern practices such as alley cropping system for woody biomass production (ACS), composed of strips of fast growing trees and agricultural crops grown in alleys between the tree rows, can supply market goods and environmental services at the same time (Gruenewald et al. 2007, Quinkenstein et al. 2009). However, farmers in Germany have been reluctant to implement the latter systems, because agricultural policies have limited the number of trees within agricultural systems, while the former have been in danger of abandonment throughout Europe. As a result many farmers have lost interest in AF, and those that inherited land with traditional AF systems may not recognize them as such, because they are not recognized as AF according to the EU policy. The aim of this work was to investigate familiarity with agroforestry in Germany.

Material and methods

Throughout Germany 32 farmers were interviewed half of which were managing land located in areas of HNCV and half in conventional agricultural areas. The interview was developed under the European project AGFORWARD (AGroFORestry that Will Advance Rural Development) in order to investigate the acceptance of AF by farmers on a European level. Results of these interviews were used to analyze familiarity of farmers with the concept of AF on a national scale, while considering the local conditions in detail. The distribution of farmers according to federal states is shown in **Figure 1**. The contacts were located randomly by searching internet databases or were provided by the European Agroforestry Federation (EURAF) and BTU Cottbus-Senftenberg.

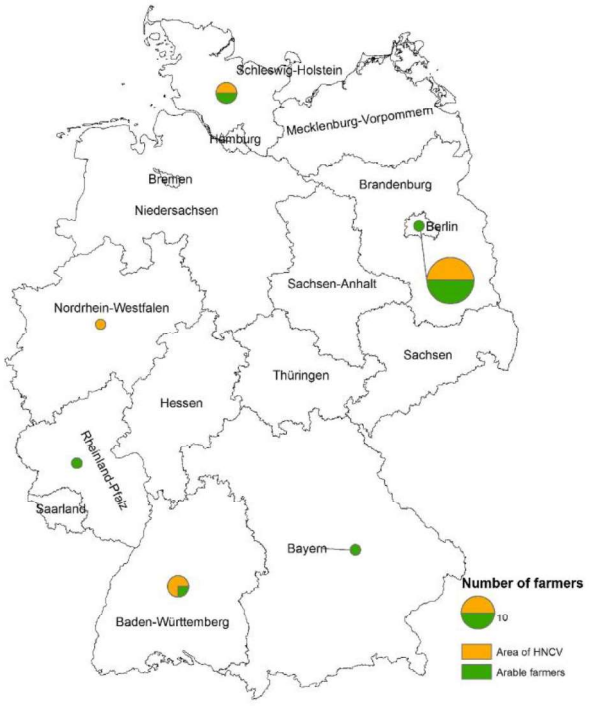

Figure 12: Map of Germany with number of interviewed farmers in area of high natural and cultural value (HNCV) and arable farmers by Federal State

Furthermore, at the local level within the German project AUFWERTEN (Agroforestry for Environmental Services, Energy Production and Added Value) a bottom up approach is

currently applied to improve the uptake of agroforestry in Germany. The collaborative efforts of local actors such as farmers, municipalities and biomass association representatives as well as research institutions are thus used to identify and remove barriers to the implementation of AF in Brandenburg. During 2015 several workshops, in close cooperation with farmers and administration representatives were held, the findings that are related with the definition of AF are discussed in this work.

Results and discussion

Familiarity with agroforestry in areas of high natural and cultural value (HNCV)

The predominant forms of AF for farmers in areas of HNCV were orchard meadows and hedgerows. Agroforestry was most commonly defined as a combination of agriculture and forestry, while animals were mentioned by less than 20% of the farmers interviewed (**Figure 2**). Strikingly, 75% of the farmers were not aware of the term AF. Within the case of AF in areas of HNCV farmers took over an already existing system and continued its management. According to these with orchard meadows, diversification of production was very advantageous. Despite that "Streuobst" is related with relatively low profitability due to low quality soil, it has advantageous ecological and socio-cultural features, particularly in terms of biological diversity and landscape aesthetics (Herzog 1998). Many farmers managing these traditional systems were not aware they were practicing AF, therefore increasing awareness is necessary to improve societal attitude towards AF.

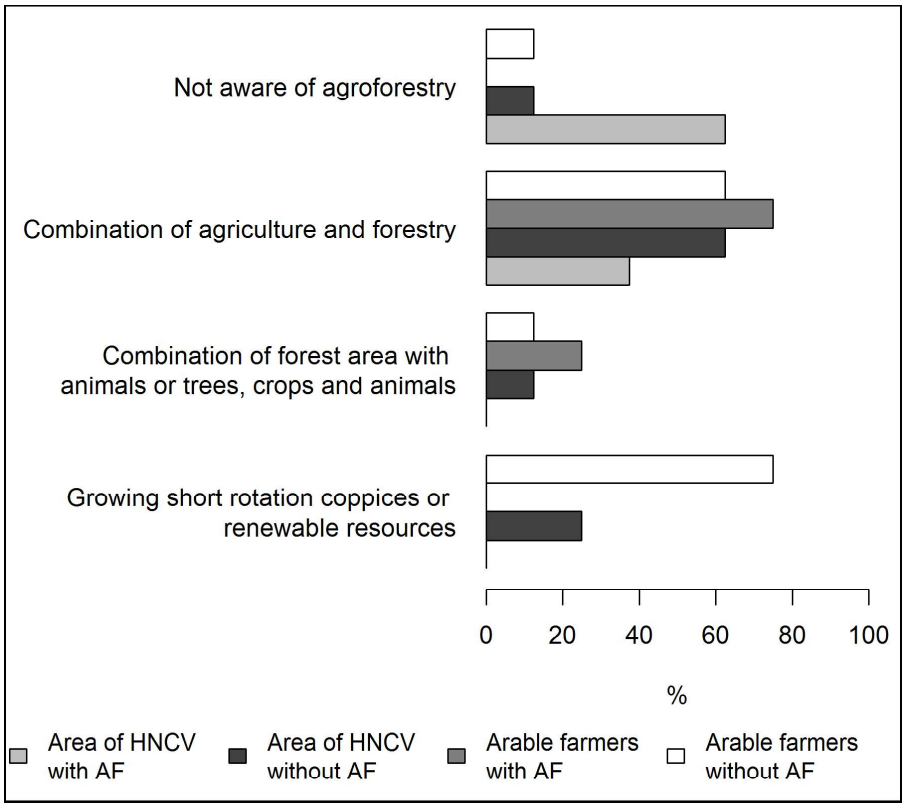

Figure 2: Summary of answers (in %) of farmers with and without agroforestry (AF) regarding to a definition of agroforestry given by farmers farming in area of high natural and cultural value (HNCV) and by arable farmers

Regarding the second traditional system, hedgerows, farmers managing them perceived them as nuisance and demonstrated readiness to remove them from the landscape, had they not been under protection. Hedgerows and windbreaks are the most common AF systems in the Atlantic region and Central Europe (Nerlich et al. 2013). The primary function of windbreaks is prevention of wind erosion, while hedgerows were used as field boundaries or living fences. In the northern part of Germany hedgerows, also called "Knicks" are common. Hedgerows have been developed through human interventions and as such are landscape structures of high cultural value. In the past the trees were periodically harvested and their biomass used as a local biomass feedstock. These regular harvests in rotation of 5 to 15 years were necessary, because hedgerows require more maintenance than other landscape elements

to ensure their structure is properly preserved (DVL 2006). With the increased interest in biomass production the use of hedgerows as a source of wood could be renewed.

Hedgerows have not been properly maintained through regular harvests during the last decades due to a reduced need for firewood and the high labour requirements. Maintaining hedgerows requires substantial financial investment and strict regulations in nature protected areas make this even more difficult. Hedgerows which are not maintained provide fewer benefits and may even have adverse effects. When trees grow too high they will shade out the adjacent agricultural land and also hamper the development of a shrubs layer, which is important for provision of habitat, as well as protection from wind erosion (DVL 2006). Hedgerows growing too wide may invade the agricultural land and impede its management (DVL 2006).

Due to lack of adequate management the trees are not only aging which diminishes their economic value, but also lose their efficiency in providing ecological functions. While existing regulations aim at protecting the tree components in the landscape, the fact that they are managed separately by nature protection agencies also prevent taking them into account in the decision making process by the farmer. The management of trees is hence decoupled from the agricultural land management. In AF, both components need to be considered simultaneously to maximize positive interaction and thus related benefits. Existing hedgerows and the agricultural land should be integrated and recognized as AF system. The management of hedgerows in these systems requires a new cost effective strategy which would improve their economic effectiveness and acceptance by farmers, as well as the provision of ecosystem functions and services.

Familiarity with agroforestry in areas for arable farming

While most of the farmers could give a definition of AF, the different forms of AF were not widely known. A combination of agriculture and forestry was the most common definition (**Figure 2**). In addition, 75% of the farmers without AF associated the term with growing short rotation coppices (SRC) which are usually used for producing bioenergy. Alley cropping is not yet commonly practiced in Germany. Several farmers have implemented ACS at experimental sites or were growing SRC on their field.

Many farmers also considered SRC as being AF. The establishment of ACS, however, implies that only a small percentage of the land will be dedicated to wood production. The major obstacle for a greater uptake of AF can be found in the lack of a clear and reliable definition. Moreover, the Article 23 of Regulation No 1305/2013 of the Common Agricultural Policy (CAP) was not implemented by the German States (BMEL 2015), which results in a lack of sufficient support for AF establishment. As a result also registration of AF areas as ecologically focus areas under greening is hampered because it is linked to Article 23. Currently, only SRC has been implemented in Germany and has therefore been recognised under greening. Establishing AF on the other hand is related with very high bureaucratic burden. In order to receive subsidies the crop and tree components have to be separately enrolled and each tree row should occupy a minimum area of 0.3 ha. In addition, the tree component has to be harvested within 20 years, which excludes high value trees.

Agroforestry system consisting of both a woody and crop component should be recognized as one system in order to optimize the benefits provided by the system. To make the concept of AF operational a definition of AF system and practices which complies with the national regulations is crucial. Creating a definition of alley cropping agroforestry practice is therefore a work in progress currently conducted by the project AUFWERTEN. The definition should allow flexibility in implementing the system, but should also ensure that the system provides the expected benefits to be eligible for greening. Two main characteristic of this definition currently being considered are percent of trees in the area and maximum distance between tree rows. A challenge lies in the necessity to create a definition that enables controlling bodies to easily identify whether the system can be classified as alley cropping. For this purpose a measuring stick can be used and the distance between rows of trees identified on aerial photos (**Figure 3**). The system would be recognized as alley cropping when the distance between tree rows is below the maximum distance of the measuring stick (**Figure 3a**). A difficulty when using aerial photos was found in identifying the area below the tree crown in order to accurately measure the distance between tree rows. As this is the first attempt to create a definition of alley cropping in Germany, it is a laborious activity that requires considering numerous details in the process.

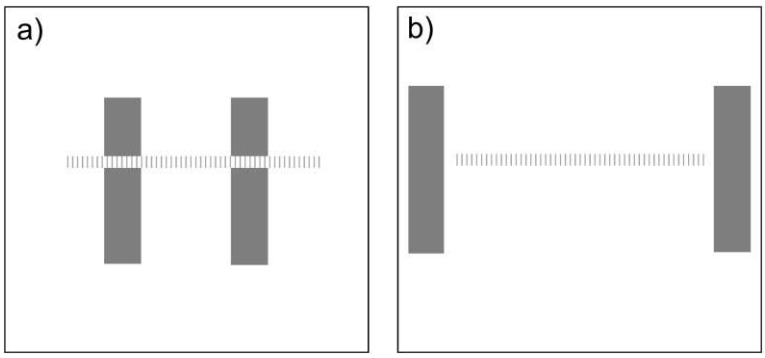

Figure 3: Example of tree row (dark grey) spacing and a measuring stick (light grey) used to identify whether the system is considered alley cropping, a) the system is alley cropping because the distance between tree rows is smaller than the maximal distance defined by the measuring stick and b) the system is not alley cropping because the distance between tree rows is larger than the maximal distance defined by the measuring stick

Conclusion

Due to regulations agricultural and forestry areas are still strictly separated in Germany which is an obstacle to obtaining benefits of multi-production systems such as agroforestry. Agroforestry systems are not well known and their proper management and implementation is hampered by the lack of a clear definition. Recognizing the crop and tree component as an integrated management system would allow for taking both components into account in the decision making process. A cost effective strategy for maintaining tree rows is required to enhance the economic and ecological value of traditional AF systems. Furthermore, a prerequisite for establishing ACS in Germany is implementing a clear definition in the national regulation. This would allow farmers to register the entire area of AF as one system, instead of separately enrolling each element for subsidies under CAP.

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